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<b>(21) International Application Number:</b> PCT/US99/22935 <b>(22) International Filing Date:</b> 13 October 1999 (13.10.99)  <b>(30) Priority Data:</b> <table border="0"><tr><td>60/103,978</td><td>13 October 1998 (13.10.98)</td><td>US</td></tr><tr><td>60/126,074</td><td>25 March 1999 (25.03.99)</td><td>US</td></tr><tr><td>60/148,053</td><td>10 August 1999 (10.08.99)</td><td>US</td></tr></table> <b>(71) Applicant (for all designated States except US):</b> THE PROCTER & GAMBLE COMPANY [US/US]; The Procter & Gamble Plaza, Cincinnati, OH 45202 (US).  <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> PANANDIKER, Rajan, Keshav [US/US]; 6484 Oregon Pass, West Chester, OH 45069 (US). RANDALL, Sherri, Lynn [US/US]; 5836 Mindy Drive, Hamilton, OH 45011 (US). LITTIG, Janet, Sue [US/US]; 159 Hidden Hills Drive, Fairfield, OH 45014 (US). GOSSELINK, Eugene, Paul [US/US]; 3754 Susanna Drive, Cincinnati, OH 45251 (US). BJORKQUIST, David, William [US/US]; 36 Oliver Road, Wyoming, OH 45215 (US).		60/103,978	13 October 1998 (13.10.98)	US	60/126,074	25 March 1999 (25.03.99)	US	60/148,053	10 August 1999 (10.08.99)	US	<b>(74) Agents:</b> REED, T., David et al.; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217-1087 (US).  <b>(81) Designated States:</b> AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
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<b>(54) Title:</b> LAUNDRY DETERGENT COMPOSITIONS WITH A CATIONICALLY CHARGED DYE MAINTENANCE POLYMER											
<b>(57) Abstract</b> <p>A detergent composition comprising from about 4 % to about 70 % of a surfactant, and from about 0.05 % to about 10 % of a dye maintenance polymer or oligomer having at least three net positive charges per molecule. The dye maintenance polymer should have a Dye Maintenance Parameter, as determined by the Dye Maintenance Parameter Test defined herein, of greater than about 0.23. Further, the dye maintenance polymer is not a polyethyleneimine or alkoxylated derivative thereof.</p>											

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**LAUNDRY DETERGENT COMPOSITIONS WITH A CATIONICALLY CHARGED  
DYE MAINTENANCE POLYMER**

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**TECHNICAL FIELD**

The present invention relates to compositions, in either liquid or granular form, for use in laundry applications, wherein the compositions comprise certain dye maintenance polymers that have a net positive charge. A standardized test is provided that determines the dye maintenance parameter for any given polymer. Compositions comprising the dye maintenance polymers of this invention impart appearance and integrity benefits to fabrics and textiles laundered in washing solutions formed from such compositions.

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**BACKGROUND OF THE INVENTION**

It is, of course, well known that alternating cycles of using and laundering fabrics and textiles, such as articles of worn clothing and apparel, will inevitably adversely affect the appearance and integrity of the fabric and textile items so used and laundered. Fabrics and textiles simply wear out over time and with use. Laundering of fabrics and textiles is necessary to remove soils and stains which accumulate therein and thereon during ordinary use. However, the laundering operation itself, over many cycles, can accentuate and contribute to the deterioration of the integrity and the appearance of such fabrics and textiles.

Deterioration of fabric integrity and appearance can manifest itself in several ways. Short fibers are dislodged from woven and knit fabric/textile structures by the mechanical action of laundering. These dislodged fibers may form lint, fuzz or "pills" which are visible on the surface of fabrics and diminish the appearance of newness of the fabric. Further, repeated laundering of fabrics and textiles, especially with bleach-containing laundry products, can remove dye from fabrics and textiles and impart a faded, worn out appearance as a result of diminished color intensity, and in many cases, as a result of changes in hues or shades of color.

Given the foregoing, there is clearly an ongoing need to identify materials which could be added to laundry products that would associate themselves with the fibers of the fabrics and textiles laundered using such products and thereby reduce or minimize the tendency of the laundered fabric/textiles to deteriorate in appearance. Any such detergent product additive material should, of course, be able to benefit fabric appearance and integrity without unduly interfering with the ability of the laundry product to perform its intended function. The present invention is directed to the use of dye maintenance polymers in laundry applications that perform in this desired manner, and a test for determining the Dye Maintenance Parameter for any given polymer.

### SUMMARY OF THE INVENTION

The present invention is directed to a detergent composition comprising:

a) from about 4% to about 70% of a surfactant that is preferably selected from the group consisting of nonionic, anionic, cationic, amphoteric, zwitterionic surfactants and mixtures thereof, and is even more preferably an anionic surfactant;

b) from about 0.01% to about 10%, preferably from about 0.1% to about 8%, more preferably from about 0.5% to about 6%, and most preferably from about 0.8% to about 5% of a dye maintenance polymer or oligomer having at least three net positive charges per molecule and having a Dye Maintenance Parameter, as determined by the Dye Maintenance Parameter Test, of greater than about 0.23, preferably greater than about 0.6 more preferably greater than about 0.8 and most preferably greater than about 0.9.

The dye maintenance polymer is not a polyethyleneimine or alkoxylated derivative thereof.

In another aspect of this invention there is provided a fabric conditioning composition comprising:

a) from about 1% to about 80% of a fabric softening active; and

b) from about 0.01% to about 50%, preferably from about 0.1% to about 40%, more preferably from about 0.5% to about 30%, and most preferably from about 0.8% to about 20% of a dye maintenance polymer or oligomer having at least three net positive charges per molecule and having a Dye Maintenance Parameter, as determined by the Dye Maintenance Parameter Test, of greater than about 0.23, preferably greater than about 0.6 more preferably greater than about 0.8 and most preferably greater than about 0.9.

The dye maintenance polymer is not a polyethyleneimine or alkoxylated derivative thereof.

In yet another aspect of this invention there is provided a laundry additive composition comprising:

- a) from about 1% to about 99% by weight of water; and
- b) from about 0.01% to about 50%, preferably from about 0.1% to about 40%, more preferably from about 0.5% to about 30%, and most preferably from about 0.8% to about 20% of a dye maintenance polymer or oligomer having at least three net positive charges per molecule and having a Dye Maintenance Parameter, as determined by the Dye Maintenance Parameter Test, of greater than about 0.23, preferably greater than about 0.6 more preferably greater than about 0.8 and most preferably greater than about 0.9.

The dye maintenance polymer is not a polyethyleneimine or alkoxylated derivative thereof.

In addition to the surfactant and the dye maintenance polymer of this invention, the laundry detergent compositions herein comprise from about 0.01% to 80% by weight of an organic or inorganic detergency builder and other conventional laundry detergent products.

In addition to the fabric softener and the dye maintenance polymer of this invention, the fabric softener compositions herein comprise pH adjusters, other carriers and adjunct ingredients.

Aqueous solutions of the dye maintenance polymers of this invention comprise from about 0.05% to about 50% by weight of the dye maintenance polymers of this invention, fabric treatment materials dissolved in water and other ingredients such as stabilizers and pH adjusters.

In its method aspect, the present invention relates to the laundering or treating of fabrics and textiles in aqueous washing, rinsing, or treating solutions formed from effective amounts of any of the detergent compositions, fabric softener compositions, or aqueous solution treatments described herein, or formed from the individual components of such compositions. Laundering of fabrics and textiles in such washing, rinsing and/or treatment solutions, followed by drying, imparts fabric appearance benefits to the fabric and textile articles so treated. Such benefits can include improved overall appearance, pill/fuzz reduction, antifading, improved abrasion resistance, and/or enhanced softness. It has been surprisingly determined that the dye maintenance polymers of this invention impart fabric appearance and integrity benefits that are greater than the benefits achieved by a corresponding amount of either component by itself.

### **DETAILED DESCRIPTION OF THE INVENTION**

As noted, when fabric or textiles are laundered in solutions which comprise the dye maintenance polymers of the present invention fabric appearance and integrity are enhanced. The dye maintenance polymers can be added to wash solutions by incorporating them into a detergent composition, a fabric softener or by adding them separately to the washing solution. The dye maintenance polymers are described herein primarily as liquid or granular detergent additives but the present invention is not meant to be so limited. The dye maintenance polymers, detergent

composition components, optional ingredients for such compositions and methods of using such compositions, are described in detail below. All percentages are by weight unless other specified.

#### Dye Maintenance Polymers

5       The dye maintenance polymers of this invention can be used in any fabric laundering process and provide certain appearance benefits to the fabrics laundered in these processes. Such fabric appearance benefits can include, for example, improved overall appearance of the laundered fabrics, reduction of the formation of pills and fuzz, protection against color fading, improved abrasion resistance, etc. The dye maintenance polymers used in the compositions and  
10       methods herein can provide such fabric appearance benefits with acceptably little or no loss in cleaning performance provided by the laundry detergent compositions into which such materials are incorporated.

As will be apparent to those skilled in the art, an oligomer is a molecule consisting of only a few monomer units while polymers comprise considerably more monomer units. For the present  
15       invention, oligomers are defined as molecules having an average molecular weight below about 1,000 and polymers are molecules having an average molecular weight of greater than about 1,000. Copolymers are polymers or oligomers wherein two or more dissimilar monomers have been simultaneously or sequentially polymerized. Copolymers of the present invention can include, for example, polymers or oligomers polymerized from a polyfunctional alkylating agent  
20       such as epichlorohydrin with a mixture of a cyclic amine-based monomer, e.g., piperazine and another cyclic amine-based monomer, e.g., morpholine.

Cationic polymers in general and their method of manufacture are known. For example, a detailed description of cationic polymers can be found in an article by M. Fred Hoover that was published in the *Journal of Macromolecular Science-Chemistry*, A4(6), pp 1327-1417, October,  
25       1970. The entire disclosure of the Hoover article is incorporated herein by reference. The dye maintenance polymers of this invention will be better understood when read in light of the Hoover article, the present disclosure and the Examples herein.

Table A lists 6 patent applications that describe various dye maintenance polymers according to this invention, methods of making these polymers and methods of using them. The  
30       entire disclosure of each of the applications listed in Table A is incorporated herein by reference.

**Table A**

TITLE	INVENTOR (S)	FILING DATE	SERIAL #
Laundry Detergent Compositions with	Randall	8/8/97	PCT/US98/

Amino Acid Based Polymers to Provide Appearance and Integrity Benefits to Fabrics Laundered Therewith	et al.		16536
Laundry Detergent Compositions with Cyclic Amine-Based Polymers to Provide Appearance and Integrity Benefits to Fabrics Laundered Therewith	Panandiker et al.	9/15/98	PCT/US98/ 19143
Laundry Detergent Compositions with Amino Acid Based Polymers to Provide Appearance and Integrity Benefits to Fabrics Laundered Therewith	Randall et al.	8/7/98	PCT/US98/ 16495
Laundry Detergent Compositions with Anionically Modified, Cyclic Amine Based Polymers	Panandiker et al.	9/15/98	PCT/US98/ 19141
Laundry Detergent and Fabric Conditioning Compositions with Oxidized Cyclic Amine Based Polymers	Panandiker et al.	9/15/98	PCT/US98/ 19144
Laundry Detergent Compositions with A Combination of Cyclic Amine Based Polymers and Hydrophobically Modified Carboxy Methyl Cellulose	Panandiker et al.	10/13/98	60/103,978

In addition to the dye maintenance polymers of the present invention, the present laundry detergent and additive compositions can include common detergent adjuvants as defined in greater detail below. The detergent compositions of this invention include a surfactant selected from the group consisting of nonionic, anionic, cationic, amphoteric, zwitterionic surfactants and mixtures thereof. Preferably, at least about 4% by weight of the surfactant is an anionic surfactant.

The most common detergent ingredients that are preferred for use in the present invention include: deterative enzymes, preferably cellulase and preferably an enzyme stabilization system; an inorganic peroxygen bleaching compound, which is preferably selected from the group

consisting of alkali metal salts of perborate, percarbonate and mixtures thereof, and a bleach activator, which is preferably nonanoyloxybenzene sulfonate. The laundry additive compositions of this invention preferably comprise a pH adjuster and one or more fabric softening components.

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### Deterasive Surfactant

The detergent compositions herein comprise from about 4% to 80% by weight of a deterasive surfactant. Preferably such compositions comprise from about 5% to 50% by weight of surfactant. Deterasive surfactants utilized can be of the anionic, nonionic, zwitterionic, ampholytic or cationic type or can comprise compatible mixtures of these types. Detergent surfactants useful herein are described in U.S. Patent 3,664,961, Norris, issued May 23, 1972, U.S. Patent 3,919,678, Laughlin et al., issued December 30, 1975, U.S. Patent 4,222,905, Cockrell, issued September 16, 1980, and in U.S. Patent 4,239,659, Murphy, issued December 16, 1980. All of these patents are incorporated herein by reference. Of all the surfactants, anionics and nonionics are preferred.

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Useful anionic surfactants can themselves be of several different types. For example, water-soluble salts of the higher fatty acids, i.e., "soaps", are useful anionic surfactants in the compositions herein. This includes alkali metal soaps such as the sodium, potassium, ammonium, and alkylolammonium salts of higher fatty acids containing from about 8 to about 24 carbon atoms, and preferably from about 12 to about 18 carbon atoms.

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Additional non-soap anionic surfactants which are suitable for use herein include the water-soluble salts, preferably the alkali metal, and ammonium salts, of organic sulfuric reaction products having in their molecular structure an alkyl group containing from about 10 to about 20 carbon atoms and a sulfonic acid or sulfuric acid ester group. (Included in the term "alkyl" is the alkyl portion of acyl groups.) Especially valuable are linear straight chain alkylbenzene sulfonates in which the average number of carbon atoms in the alkyl group is from about 11 to 13, abbreviated as C<sub>11-13</sub> LAS.

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Preferred nonionic surfactants are those of the formula  $R_1(OC_2H_4)_nOH$ , wherein  $R_1$  is a C<sub>10</sub>-C<sub>16</sub> alkyl group or a C<sub>8</sub>-C<sub>12</sub> alkyl phenyl group, and n is from 3 to about 80. Particularly preferred are condensation products of C<sub>12</sub>-C<sub>15</sub> alcohols with from about 5 to about 20 moles of ethylene oxide per mole of alcohol, e.g., C<sub>12</sub>-C<sub>13</sub> alcohol condensed with about 6.5 moles of ethylene oxide per mole of alcohol.

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Additional suitable surfactants, including polyhydroxy fatty acid amides and amine based surfactants, are disclosed in one or more of the co-pending PCT Applications listed in Table A and incorporated herein by reference.

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### Detergent Builder

The detergent compositions herein may also comprise from about 0.1% to 80% by weight of a detergent builder. Preferably such compositions in liquid form will comprise from about 1% to 10% by weight of the builder component. Preferably such compositions in granular form will comprise from about 1% to 50% by weight of the builder component. Detergent builders are well known in the art and can comprise, for example, phosphate salts as well as various organic and inorganic nonphosphorus builders.

Water-soluble, nonphosphorus organic builders useful herein include the various alkali metal, ammonium and substituted ammonium polyacetates, carboxylates, polycarboxylates and polyhydroxy sulfonates. Suitable polycarboxylates for use herein are the polyacetal carboxylates described in U.S. Patent 4,144,226, issued March 13, 1979 to Crutchfield et al., and U.S. Patent 4,246,495, issued March 27, 1979 to Crutchfield et al., both of which are incorporated herein by reference. Particularly preferred polycarboxylate builders are the oxydisuccinates and the ether carboxylate builder compositions comprising a combination of tartrate monosuccinate and tartrate disuccinate described in U.S. Patent 4,663,071, Bush et al., issued May 5, 1987, the disclosure of which is incorporated herein by reference.

Examples of suitable nonphosphorus, inorganic builders include the silicates, aluminosilicates, borates and carbonates. Particularly preferred are sodium and potassium carbonate, bicarbonate, sesquicarbonate, tetraborate decahydrate, and silicates having a weight ratio of  $\text{SiO}_2$  to alkali metal oxide of from about 0.5 to about 4.0, preferably from about 1.0 to about 2.4. Also preferred are aluminosilicates including zeolites. Such materials and their use as detergent builders are more fully discussed in Corkill et al., U. S. Patent No. 4,605,509, the disclosure of which is incorporated herein by reference. Also discussed in U. S. Patent No. 4,605,509 are crystalline layered silicates which are suitable for use in the detergent compositions of this invention.

### Optional Detergent Ingredients

In addition to the surfactants, builders and dye maintenance polymers of the detergent compositions of the present invention can also include any number of additional optional ingredients. These include conventional detergent composition components such as enzymes and enzyme stabilizing agents, suds boosters or suds suppressers, anti-tarnish and anticorrosion agents, bleaching agents, soil suspending agents, soil release agents, germicides, pH adjusting agents, non-builder alkalinity sources, chelating agents, organic and inorganic fillers, solvents, hydrotropes, optical brighteners, dyes and perfumes.

pH adjusting agents may be necessary in certain applications where the pH of the wash solution is greater than about 10.0 because the fabric integrity benefits of the defined compositions begin to diminish at a higher pH. Hence, if the wash solution is greater than about 10.0 after the addition of the dye maintenance polymers of the present invention a pH adjuster should be used to reduce the pH of the washing solution to below about 10.0, preferably to a pH of below about 9.5 and most preferably below about 7.5. Suitable pH adjusters will be known to those skilled in the art.

A preferred optional ingredients for incorporation into the detergent compositions herein comprises a bleaching agent, e.g., a peroxygen bleach. Such peroxygen bleaching agents may be organic or inorganic in nature. Inorganic peroxygen bleaching agents are frequently utilized in combination with a bleach activator.

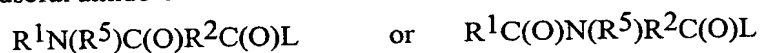
Useful organic peroxygen bleaching agents include percarboxylic acid bleaching agents and salts thereof. Suitable examples of this class of agents include magnesium monoperoxyphthalate hexahydrate, the magnesium salt of metachloro perbenzoic acid, 4-nonylamino-4-oxoperoxybutyric acid and diperoxydodecanedioic acid. Such bleaching agents are disclosed in U.S. Patent 4,483,781, Hartman, Issued November 20, 1984; European Patent Application EP-A-133,354, Banks et al., Published February 20, 1985; and U.S. Patent 4,412,934, Chung et al., Issued November 1, 1983. Highly preferred bleaching agents also include 6-nonylamino-6-oxoperoxy-caproic acid (NAPAA) as described in U.S. Patent 4,634,551, Issued January 6, 1987 to Burns et al.

Inorganic peroxygen bleaching agents may also be used, generally in particulate form, in the detergent compositions herein. Inorganic bleaching agents are in fact preferred. Such inorganic peroxygen compounds include alkali metal perborate and percarbonate materials. For example, sodium perborate (e.g. mono- or tetra-hydrate) can be used. Suitable inorganic bleaching agents can also include sodium or potassium carbonate peroxyhydrate and equivalent "percarbonate" bleaches, sodium pyrophosphate peroxyhydrate, urea peroxyhydrate, and sodium peroxide. Persulfate bleach (e.g., OXONE, manufactured commercially by DuPont) can also be used. Frequently inorganic peroxygen bleaches will be coated with silicate, borate, sulfate or water-soluble surfactants. For example, coated percarbonate particles are available from various commercial sources such as FMC, Solvay Interlox, Tokai Denka and Degussa.

Inorganic peroxygen bleaching agents, e.g., the perborates, the percarbonates, etc., are preferably combined with bleach activators, which lead to the *in situ* production in aqueous solution (i.e., during use of the compositions herein for fabric laundering/bleaching) of the peroxy acid corresponding to the bleach activator. Various non-limiting examples of activators are disclosed in U.S. Patent 4,915,854, Issued April 10, 1990 to Mao et al.; and U.S. Patent 4,412,934

Issued November 1, 1983 to Chung et al. The nonanoyloxybenzene sulfonate (NOBS) and tetraacetyl ethylene diamine (TAED) activators are typical and preferred. Mixtures thereof can also be used. See also the hereinbefore referenced U.S. 4,634,551 for other typical bleaches and activators useful herein.

5 Other useful amido-derived bleach activators are those of the formulae:



wherein  $R^1$  is an alkyl group containing from about 6 to about 12 carbon atoms,  $R^2$  is an alkylene containing from 1 to about 6 carbon atoms,  $R^5$  is H or alkyl, aryl, or alkaryl containing from about 1 to about 10 carbon atoms, and L is any suitable leaving group. A leaving group is any  
10 group that is displaced from the bleach activator as a consequence of the nucleophilic attack on the bleach activator by the perhydrolysis anion. A preferred leaving group is phenol sulfonate.

Preferred examples of bleach activators of the above formulae include (6-octanamido-caproyl)oxybenzenesulfonate, (6-nonanamidocaproyl) oxybenzene-sul-fonate, (6-decanamido-caproyl)oxybenzenesulfonate and mixtures thereof as described in the hereinbefore referenced  
15 U.S. Patent 4,634,551.

Another class of useful bleach activators comprises the benzoxazin-type activators disclosed by Hodge et al. in U.S. Patent 4,966, 723, Issued October 30, 1990, incorporated herein by reference. See also U.S. Patent 4,545,784, Issued to Sanderson, October 8, 1985, incorporated herein by reference, which discloses acyl caprolactams, including benzoyl caprolactam, adsorbed  
20 into sodium perborate.

If utilized, peroxygen bleaching agent will generally comprise from about 2% to 30% by weight of the detergent compositions herein. More preferably, peroxygen bleaching agent will comprise from about 2% to 20% by weight of the compositions. Most preferably, peroxygen bleaching agent will be present to the extent of from about 3% to 15% by weight of the  
25 compositions herein. If utilized, bleach activators can comprise from about 2% to 10% by weight of the detergent compositions herein. Frequently, activators are employed such that the molar ratio of bleaching agent to activator ranges from about 1:1 to 10:1, more preferably from about 1.5:1 to 5:1.

Additional suitable bleaching agents and bleach activators are disclosed in one or more of  
30 the co-pending PCT Applications listed in Table A and incorporated herein by reference.

Another highly preferred optional ingredient in the detergent compositions herein is a deterative enzyme component. Enzymes can be included in the present detergent compositions for a variety of purposes, including removal of protein-based, carbohydrate-based, or triglyceride-based stains from substrates, for the prevention of refugee dye transfer in fabric  
35 laundering, and for fabric restoration. Suitable enzymes include proteases, amylases, lipases,

cellulases, peroxidases, and mixtures thereof of any suitable origin, such as vegetable, animal, bacterial, fungal and yeast origin. Preferred selections are influenced by factors such as pH-activity and/or stability, optimal thermostability, and stability to active detergents, builders and the like. In this respect bacterial or fungal enzymes are preferred, such as bacterial amylases and proteases, and fungal cellulases.

"Detergent enzyme", as used herein, means any enzyme having a cleaning, stain removing or otherwise beneficial effect in a laundry detergent composition. Preferred enzymes for laundry purposes include, but are not limited to, proteases, cellulases, lipases, amylases and peroxidases.

Enzymes are normally incorporated into detergent compositions at levels sufficient to provide a "cleaning-effective amount". The term "cleaning-effective amount" refers to any amount capable of producing a cleaning, stain removal, soil removal, whitening, deodorizing, or freshness improving effect on substrates such as fabrics. In practical terms for current commercial preparations, typical amounts are up to about 5 mg by weight, more typically 0.01 mg to 3 mg, of active enzyme per gram of the detergent composition. Stated otherwise, the compositions herein will typically comprise from 0.001% to 5%, preferably 0.01%-1% by weight of a commercial enzyme preparation. Protease enzymes are usually present in such commercial preparations at levels sufficient to provide from 0.005 to 0.1 Anson units (AU) of activity per gram of composition. Higher active levels may be desirable in highly concentrated detergent formulations.

Cellulases usable herein include those disclosed in U.S. Patent No. 4,435,307, Barbesgaard et al., March 6, 1984, and GB-A-2.075.028; GB-A-2.095.275 and DE-OS-2.247.832. CAREZYME® and CELLUZYME® (Novo) are especially useful. See also WO 9117243 to Novo.

The enzyme-containing compositions herein may optionally also comprise from about 0.001% to about 10%, preferably from about 0.005% to about 8%, most preferably from about 0.01% to about 6%, by weight of an enzyme stabilizing system. The enzyme stabilizing system can be any stabilizing system which is compatible with the detergent enzyme. Such a system may be inherently provided by other formulation actives, or be added separately, e.g., by the formulator or by a manufacturer of detergent-ready enzymes. Such stabilizing systems can, for example, comprise calcium ion, boric acid, propylene glycol, short chain carboxylic acids, boronic acids, and mixtures thereof, and are designed to address different stabilization problems depending on the type and physical form of the detergent composition.

### Detergent Composition Preparation

The detergent compositions according to the present invention can be in liquid, paste or granular form. Such compositions can be prepared by combining the essential and optional components in the requisite concentrations in any suitable order and by any conventional means. The forgoing description of uses for the dye maintenance polymers defined herein are intended to be exemplary and other uses will be apparent to those skilled in the art and are intended to be within the scope of the present invention.

Granular compositions, for example, are generally made by combining base granule ingredients, e.g., surfactants, builders, water, etc., as a slurry, and spray drying the resulting slurry to a low level of residual moisture (5-12%). The remaining dry ingredients, e.g., granules of the essential dye maintenance polymers, can be admixed in granular powder form with the spray dried granules in a rotary mixing drum. The liquid ingredients, e.g., solutions of the essential dye maintenance polymers, enzymes, binders and perfumes, can be sprayed onto the resulting granules to form the finished detergent composition. Granular compositions according to the present invention can also be in "compact form", i.e. they may have a relatively higher density than conventional granular detergents, i.e. from 550 to 950 g/l. In such case, the granular detergent compositions according to the present invention will contain a lower amount of "inorganic filler salt", compared to conventional granular detergents; typical filler salts are alkaline earth metal salts of sulphates and chlorides, typically sodium sulphate; "compact" detergents typically comprise not more than 10% filler salt.

Liquid detergent compositions can be prepared by admixing the essential and optional ingredients thereof in any desired order to provide compositions containing components in the requisite concentrations. Liquid compositions according to the present invention can also be in "compact form", in such case, the liquid detergent compositions according to the present invention will contain a lower amount of water, compared to conventional liquid detergents. Addition of the dye maintenance polymers to liquid detergent or other aqueous compositions of this invention may be accomplished by simply mixing into the liquid solutions the desired dye maintenance polymers.

### Fabric Laundering Method

The present invention also provides a method for laundering fabrics in a manner which imparts fabric appearance benefits provided by the dye maintenance polymers used herein. Such a method employs contacting these fabrics with an aqueous washing solution formed from an effective amount of the detergent compositions hereinbefore described or formed from the

individual components of such compositions. Contacting of fabrics with washing solution will generally occur under conditions of agitation although the compositions of the present invention may also be used to form aqueous unagitated soaking solutions for fabric cleaning and treatment. As discussed above, it is preferred that the washing solution have a pH of less than about 10.0, preferably it has a pH of about 9.5 and most preferably it has a pH of about 7.5.

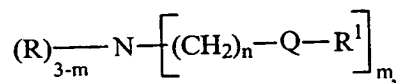
Agitation is preferably provided in a washing machine for good cleaning. Washing is preferably followed by drying the wet fabric in a conventional clothes dryer. An effective amount of a high density liquid or granular detergent composition in the aqueous wash solution in the washing machine is preferably from about 500 to about 7000 ppm, more preferably from about 1000 to about 3000 ppm.

#### Fabric Conditioning and Softening

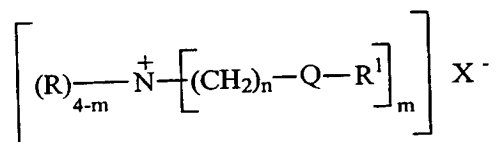
The dye maintenance polymers hereinbefore described as components of the laundry detergent compositions herein may also be used to treat and condition fabrics and textiles in the absence of the deterative surfactant and builder components of the detergent composition embodiments of this invention. Thus, for example, a fabric conditioning composition comprising a fabric softener and the dye maintenance polymer or a fabric treatment composition comprising only the dye maintenance polymers themselves, or comprising an aqueous solution of the dye maintenance polymers, may be added during the rinse cycle of a conventional home laundering operation in order to impart the desired fabric appearance and integrity benefits hereinbefore described.

The fabric softener compositions of the present invention comprise at least about 1%, preferably from about 8%, more preferably from about 20% to about 80%, more preferably to about 60%, most preferably to about 45% by weight, of the composition of one or more fabric softener actives.

The preferred fabric softening actives according to the present invention are amines having the formula:

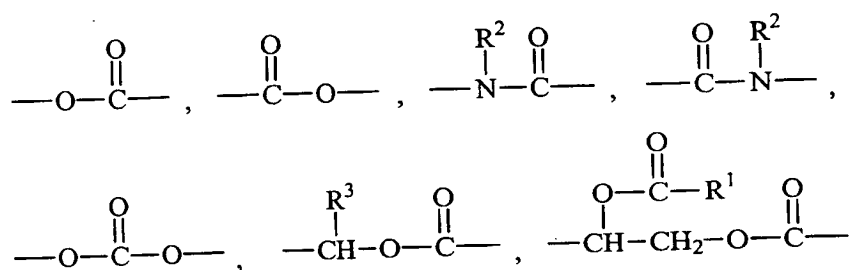


quatarnary ammonium compounds having the formula:



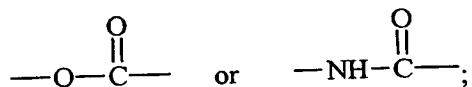
and mixtures thereof, wherein each R is independently C<sub>1</sub>-C<sub>6</sub> alkyl, C<sub>1</sub>-C<sub>6</sub> hydroxyalkyl, benzyl, and mixtures thereof; R<sup>1</sup> is preferably C<sub>11</sub>-C<sub>22</sub> linear alkyl, C<sub>11</sub>-C<sub>22</sub> branched alkyl, C<sub>11</sub>-C<sub>22</sub> linear alkenyl, C<sub>11</sub>-C<sub>22</sub> branched alkenyl, and mixtures thereof; Q is a carbonyl moiety

5 independently selected from the units having the formula:



wherein R<sup>2</sup> is hydrogen, C<sub>1</sub>-C<sub>4</sub> alkyl, preferably hydrogen; R<sup>3</sup> is C<sub>1</sub>-C<sub>4</sub> alkyl, preferably hydrogen or methyl; preferably Q has the formula:

10



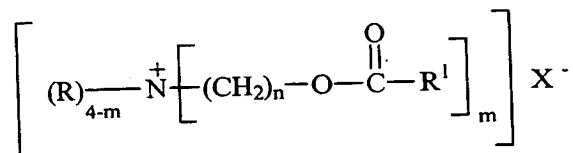
X is a softener compatible anion, preferably the anion of a strong acid, for example, chloride, bromide, methylsulfate, ethylsulfate, sulfate, nitrate and mixtures thereof, more preferably chloride and methyl sulfate. The anion can also, but less preferably, carry a double charge, in which case X<sup>(-)</sup> represents half a group. The index m has a value of from 1 to 3; the index n has a value of from 1 to 4, preferably 2 or 3, more preferably 2.

15

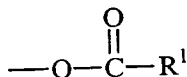
One embodiment of the present invention provides for amines and quaternized amines having two or more different values for the index n per molecule, for example, a softener active prepared from the starting amine methyl(3-aminopropyl)(2-hydroxyethyl)amine.

20

More preferred softener actives according to the present invention have the formula:



wherein the unit having the formula:



is a fatty acyl moiety. Suitable fatty acyl moieties for use in the softener actives of the present invention are derived from sources of triglycerides including tallow, vegetable oils and/or partially hydrogenated vegetable oils including *inter alia* canola oil, safflower oil, peanut oil, sunflower oil, corn oil, soybean oil, tall oil, rice bran oil. Yet more preferred are the Diester  
 5 Quaternary Ammonium Compounds (DEQA's) wherein the index m is equal to 2.

The formulator, depending upon the desired physical and performance properties of the final fabric softener active, can choose any of the above mentioned sources of fatty acyl moieties, or alternatively, the formulator can mix sources of triglyceride to form a "customized blend".  
 10 However, those skilled in the art of fats and oils recognize that the fatty acyl composition may vary, as in the case of vegetable oil, from crop to crop, or from variety of vegetable oil source to variety of vegetable oil source. DEQA's which are prepared using fatty acids derived from natural sources are preferred.

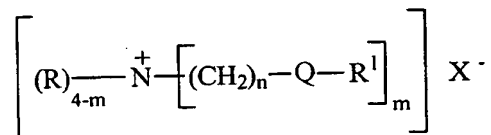
A preferred embodiment of the present invention provides softener actives comprising R<sup>1</sup>  
 15 units which have at least about 3%, preferably at least about 5%, more preferably at least about 10%, most preferably at least about 15% C<sub>11</sub>-C<sub>22</sub> alkenyl, including polyalkenyl (polyunsaturated) units *inter alia* oleic, linoleic, linolenic.

For the purposes of the present invention the term "mixed chain fatty acyl units" is defined as "a mixture of fatty acyl units comprising alkyl and alkenyl chains having from 10  
 20 carbons to 22 carbon atoms including the carbonyl carbon atom, and in the case of alkenyl chains, from one to three double bonds, preferably all double bonds in the *cis* configuration". With regard to the R<sup>1</sup> units of the present invention, it is preferred that at least a substantial percentage of the fatty acyl groups are unsaturated, e.g., from about 25%, preferably from about 50% to about 70%, preferably to about 65%. The total level of fabric softening active containing  
 25 polyunsaturated fatty acyl groups can be from about 3%, preferably from about 5%, more preferably from about 10% to about 30%, preferably to about 25%, more preferably to about 18%. As stated herein above *cis* and *trans* isomers can be used, preferably with a *cis/trans* ratio is of from 1:1, preferably at least 3:1, and more preferably from about 4:1 to about 50:1, more preferably about 20:1, however, the minimum being 1:1.

30 The level of unsaturation contained within the tallow, canola, or other fatty acyl unit chain can be measured by the Iodine Value (IV) of the corresponding fatty acid, which in the present case should preferably be in the range of from 5 to 100 with two categories of compounds being distinguished, having a IV below or above 25.



Indeed, for compounds having the formula:



5 derived from tallow fatty acids, when the Iodine Value is from 5 to 25, preferably 15 to 20, it has been found that a *cis/trans* isomer weight ratio greater than about 30/70, preferably greater than about 50/50 and more preferably greater than about 70/30 provides optimal concentrability.

For compounds of this type made from tallow fatty acids having a Iodine Value of above 25, the ratio of *cis* to *trans* isomers has been found to be less critical unless very high concentrations are needed. A further preferred embodiment of the present invention comprises  
10 DEQA's wherein the average Iodine Value for  $R^1$  is approximately 45.

The  $R^1$  units suitable for use in the isotropic liquids present invention can be further characterized in that the Iodine Value (IV) of the parent fatty acid, said IV is preferably from about 10, more preferably from about 50, most preferably from about 70, to a value of about 140, preferably to about 130, more preferably to about 115. However, formulators, depending upon  
15 which embodiment of the present invention they choose to execute, may wish to add an amount of fatty acyl units which have Iodine Values outside the range listed herein above. For example, "hardened stock" (IV less than or equal to about 10) may be combined with the source of fatty acid admixture to adjust the properties of the final softener active.

A preferred source of fatty acyl units, especially fatty acyl units having branching, for  
20 example, "Guerbet branching", methyl, ethyl, etc. units substituted along the primary alkyl chain, synthetic sources of fatty acyl units are also suitable. For example, the formulator may wish to add one or more fatty acyl units having a methyl branch at a "non-naturally occurring" position, for example, at the third carbon of a  $C_{17}$  chain. What is meant herein by the term "non-naturally occurring" is "acyl units which are not found in significant (greater than about 0.1%) quantities is  
25 common fats and oils which serve as feedstocks for the source of triglycerides described herein." If the desired branched chain fatty acyl unit is unavailable from readily available natural feedstocks, therefore, synthetic fatty acid can be suitably admixed with other synthetic materials or with other natural triglyceride derived sources of acyl units.

The following are examples of preferred softener actives according to the present  
30 invention.

N,N-di(tallowyl-oxy-ethyl)-N,N-dimethyl ammonium chloride;  
N,N-di(canolyl-oxy-ethyl)-N,N-dimethyl ammonium chloride;

N,N-di(tallowyl-oxy-ethyl)-N-methyl, N-(2-hydroxyethyl) ammonium methyl sulfate;  
 N,N-di(canolyl-oxy-ethyl)-N-methyl, N-(2-hydroxyethyl) ammonium methyl sulfate;  
 N,N-di(tallowylamidoethyl)-N-methyl, N-(2-hydroxyethyl) ammonium methyl sulfate;  
 N,N-di(2-tallowyloxy-2-oxo-ethyl)-N,N-dimethyl ammonium chloride;  
 5 N,N-di(2-canolylloxy-2-oxo-ethyl)-N,N-dimethyl ammonium chloride;  
 N,N-di(2-tallowyloxyethylcarbonyloxyethyl)-N,N-dimethyl ammonium chloride;  
 N,N-di(2-canolylloxyethylcarbonyloxyethyl)-N,N-dimethyl ammonium chloride;  
 N-(2-tallowyloxy-2-ethyl)-N-(2-tallowyloxy-2-oxo-ethyl)-N,N-dimethyl ammonium  
 chloride;  
 10 N-(2-canolylloxy-2-ethyl)-N-(2-canolylloxy-2-oxo-ethyl)-N,N-dimethyl ammonium  
 chloride;  
 N,N,N-tri(tallowyl-oxy-ethyl)-N-methyl ammonium chloride;  
 N,N,N-tri(canolyl-oxy-ethyl)-N-methyl ammonium chloride;  
 N-(2-tallowyloxy-2-oxoethyl)-N-(tallowyl)-N,N-dimethyl ammonium chloride;  
 15 N-(2-canolylloxy-2-oxoethyl)-N-(canolyl)-N,N-dimethyl ammonium chloride;  
 1,2-ditallowyloxy-3-N,N,N-trimethylammoniopropane chloride; and  
 1,2-dicanolylloxy-3-N,N,N-trimethylammoniopropane chloride;  
 and mixtures of the above actives.

Particularly preferred is N,N-di(tallowyl-oxy-ethyl)-N,N-dimethyl ammonium chloride,  
 20 where the tallow chains are at least partially unsaturated and N,N-di(canolyl-oxy-ethyl)-N,N-  
 dimethyl ammonium chloride, N,N-di(tallowyl-oxy-ethyl)-N-methyl, N-(2-hydroxyethyl)  
 ammonium methyl sulfate; N,N-di(canolyl-oxy-ethyl)-N-methyl, N-(2-hydroxyethyl) ammonium  
 methyl sulfate; and mixtures thereof.

Additional fabric softening agents useful herein are described in U.S. 5,643,865  
 25 Mermelstein *et al.*, issued July 1, 1997; U.S. 5,622,925 de Buzzaccarini *et al.*, issued April 22,  
 1997; U.S. 5,545,350 Baker *et al.*, issued August 13, 1996; U.S. 5,474,690 Wahl *et al.*, issued  
 December 12, 1995; U.S. 5,417,868 Turner *et al.*, issued January 27, 1994; U.S. 4,661,269 Trinh  
*et al.*, issued April 28, 1987; U.S. 4,439,335 Burns, issued March 27, 1984; U.S. 4,401,578  
 Verbruggen, issued August 30, 1983; U.S. 4,308,151 Cambre, issued December 29, 1981; U.S.  
 30 4,237,016 Rudkin *et al.*, issued October 27, 1978; U.S. 4,233,164 Davis, issued November 11,  
 1980; U.S. 4,045,361 Watt *et al.*, issued August 30, 1977; U.S. 3,974,076 Wiersema *et al.*, issued  
 August 10, 1976; U.S. 3,886,075 Bernadino, issued May 6, 1975; U.S. 3,861,870 Edwards *et al.*,  
 issued January 21 1975; and European Patent Application publication No. 472,178, by Yamamura  
*et al.*, all of said documents being incorporated herein by reference.

### EXAMPLES

The following examples illustrate the compositions and methods of the present invention, but are not necessarily meant to limit or otherwise define the scope of the invention.

#### EXAMPLE I

##### Dye Maintenance Parameter Test

To evaluate a dye maintenance polymer, prepare a 10 ppm solution of the dye maintenance polymer in water. Add 800ml of this solution to a 1000mL beaker. Introduce 8 gm+/-50mg of C110 fabric (C110 is a poplin fabric dyed with Direct Black 112 and supplied by Empirical Manufacturing Company of Cincinnati, OH) swatch in the solution such that it is completely immersed in the liquid. Agitate the solution gently with a magnetic stirrer for 120 minutes. A portion of the dye from the fabric will slowly bleed into the water. After 120 minutes, withdraw an aliquot of the liquor, place it in a 5 cm path length cell and measure its absorbance at wavelength of 600nm with a Hewlett Packard Model 8453 uv-vis spectrophotometer following the general instructions provided by the manufacturer for the use of this instrument. This absorbance is called  $Abs_{\text{Polymer}}$ .

Using the procedure outlined above, repeat the procedure with distilled water alone with no added dye maintenance polymer to obtain  $Abs_{\text{Water}}$ .

**The Dye Maintenance Parameter ("DMP") is defined as  $(Abs_{\text{Water}} - Abs_{\text{Polymer}})$**

#### EXAMPLE II

##### Calculation of the Average Charge Per Molecule

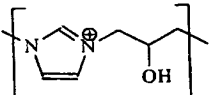
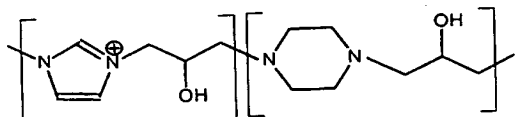
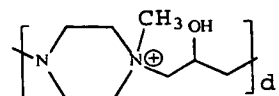
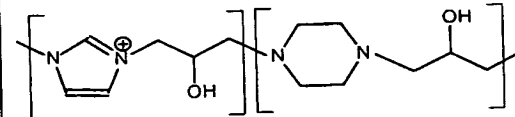
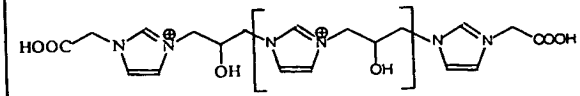
While there are many ways to calculate the charge density of a polymeric material known to those skilled in the analytical arts, one such method is as follows. Specifically, the charge density for molecules with a known chemical structure, is determined by a standard acid-base titration or a potentiometric titration to give charge to mass ratio. Charge density can then be converted to an average charge per molecule by determining the average molecular weight of the material and simply dividing the charge density by the average molecular weight to determine the average number of positive charges per molecule.

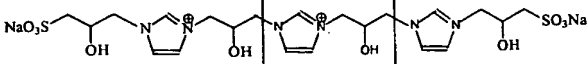
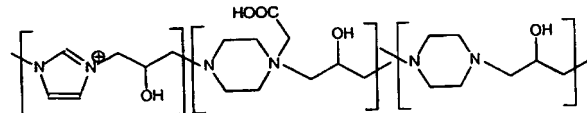
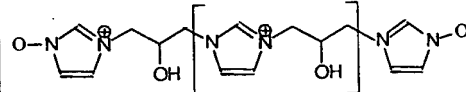
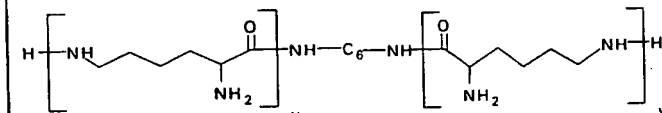
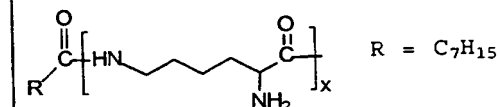
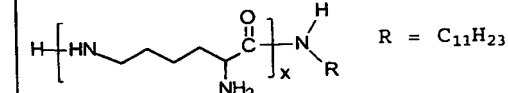
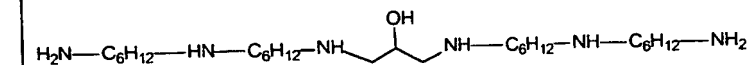
For low molecular weight materials, molecular weight is determined standard techniques such as mass spectroscopy. For polymeric materials, molecular weight is determined by gel permeation chromatography. These methods are described in analytical text books such as "Instrumental Methods of Analysis" by Willard, Merritt, Dean, and Settle.

EXAMPLE III

TABLE III comprises numerous examples according to the present invention along with some comparative examples of material known to the art of laundry detergents. The chemical structures shown in the examples below are idealized structures. Side reactions expected to occur during the condensation are not shown.

TABLE III

Ex.#	Material	DMP
1	Adduct of Imidazole-epichlorohydrin (Ratio of imidazole:epichlorohydrin 1.36:1)  (Idealized Structure)	1.200
2	Adduct of imidazole, piperazine and epichlorohydrin (ratio 1:1:2) 	0.39
3	Adduct of piperazine and epichlorohydrin (ratio 1:1) methyl quat 	
4	Adduct of imidazole, piperazine and epichlorohydrin (ratio 3:1:4) 	1.20
5	Adduct of imidazole-epichlorohydrin and chloroacetic acid (Ratio- 1.36:0.97:0.07) 	1.44

6	Adduct of imidazole-epichlorohydrin and 3chlorohydroxypropyl sulfonic acid (ratio: 1.0:0.83:0.34)	1.28
		
7	Adduct of imidazole, piperazine and epichlorohydrin (Ratio-1.0:3.0:4.0) quat with 0.32 moles of chloroacetate	1.44
		
8	Adduct of imidazole and epichlorohydrin, (ratio 1.75:1) oxidized	1.37
		
9	Adduct of imidazole, piperazine and epichlorohydrin (ratio 1:1:2) oxidized	0.33
10	Condensation product of lysine and hexamethylenediamine (ratio 5:1)	1.32
		
11	Condensation product of lysine and octanoic acid in the ratio 5:1	0.42
		
12	Condensation product of lysine and dodecylamine in the ratio 5:1	0.70
		
13	Adduct of bis (hexamethylenetriamine) and epichlorohydrin in the ratio 1.5:1	1.27
		

14	Adduct of bis (hexamethylenetriamine) and epichlorohydrin in the ratio 1.5:1 ethoxylated with 0.5 mole of ethylene oxide per N-H	1.37
15	Adduct of bis (hexamethylenetriamine) and epichlorohydrin in the ratio 1.5:1 ethoxylated with 1 mole of ethylene oxide per N-H	0.75
16	N,N bis(aminopropyl)piperazine	0.81
17	Adduct of dimethylamine and epichlorohydrin sold under the trade name Sandofix TP by Clariant, Basel Switzerland.	1.23
18	Adduct of bis(aminopropyl)methylamine and epichlorohydrin in the ratio 1.5:1  <chem>NCCCN(C)CCNCC(O)CCNCCCN(C)CCN</chem>	1.39
19	Poly(dimethylaminoethyl methacrylate)	0.68
20	Poly(dimethyldiallylammonium chloride) sold under the trade name Merquat 100 by Calgon Corporation, Pittsburg, PA.	1.26
21	Poly(dimethyldiallylammonium chloride -co- acrylamide) sold under the trade name Merquat Plus (Calgon Corporation, Pittsburg, PA).	0.23
22	Poly(dimethyldiallylammonium chloride -co- acrylamide) sold under the trade name Merquat 550 (Calgon Corporation, Pittsburg, PA).	0.33
23	Poly(dimethyldiallylammonium chloride -co- acrylic acid) sold under the trade name Merquat 280 (Calgon Corporation, Pittsburg, PA).	1.07
24	Ionene polymer of N,N,N',N' tetramethyl 1,6 hexanediamine and 1,6 dibromohexane in the ratio 4:3	1.37
25	Polyvinylamine	1.06
26	Poly(vinylamine-co-vinylalcohol) ratio 1:1	1.06
27	Poly(vinylamine-co-acrylic acid) ratio 1:1	

28	Polyallylamine	1.08
29	poly(vinylamine-co-vinyl formamide) ratio 1:1	
30	polyvinylamine ethoxylated with 0.5 moles of ethylene oxide per N-H	
31	polyvinylamine propoxylated with 0.5 moles of propylene oxide per N-H	
32	Condensation adduct of guanidine and diethylenetriamine sold under the Trade name Tinofix ECO by Ciba Specialty Chemicals, Basel, Switzerland	
33	Condensation adduct of guanidine and diethylenetriamine sold under the Trade name Sandofix WE by Clariant, Basel, Switzerland	0.97
34	Polyquaternium 2 (CTFA nomenclature) sold under the trade name Mirapol A15 by Rhone Poulenc, Paris, France.	1.11
35	Polyquaternium 17(CTFA nomenclature) sold under the trade name Mirapol AD-1 by Rhone Poulenc, Paris, France.	
36	Copolymer of N methylvinyl pyridine co-vinyl pyridine (ratio 4:1)	0.99
37	Copolymer of N methylvinyl pyridine co-vinyl pyridine (ratio 4:6)	1.13
38	Poly(N methylvinyl pyridine co-vinyl pyridine N oxide) ratio 4:1	0.96
39	Poly (N methylvinyl pyridine co-vinyl pyridine N-oxide) ratio 4:6	0.65
	<b>Comparative Examples</b>	
40	Ethoxylated tetraethylenepentamine example from Vandermeer, US Patent 4,597,898	

41	Polyethyleneimine MW 1200 ethoxylated with 1 mole ethylene oxide per N-H, example from Watson, US Patent 5,565,145	-0.27
42	Polyethyleneimine MW 1200 ethoxylated with 7 moles ethylene oxide per N-H, example from Watson, US Patent 5,565,145	-0.35
43	Polyethyleneimine MW 600 ethoxylated with 20 moles ethylene oxide per N-H example from Ghosh, US Patent 5, 854,949	-0.07
44	Polyethyleneimine MW 1200 ethoxylated with 7 moles ethylene oxide per N-H, 9.5% methyl quat example from Ghosh, US Patent 5,854,949	0.09
45	Poly(vinyl pyridine- N oxide) example from Fredj, US Patent 5,783,548	0.03
46	Poly(vinyl pyrrolidone), commercial material available from International Specialty Products, Wayne, NJ	
47	Poly(vinyl pyrrolidone-co-vinyl imidazole) example from Busch US Patent 5,710,119	
48	Poly( e-aminocaprolactam-co-caprolactam) sold under the trade name Nylon AQ A90 by Toray, Japan	-0.09

#### EXAMPLE IV

##### Granular Detergent Test Composition Preparation

- Several heavy duty granular detergent compositions are prepared containing one or more dye maintenance polymer having a DMP according to this invention. These granular detergent compositions all have the following basic formula:
- 5



TABLE IV

<u>Component</u>	<u>Wt. %</u>
<b>C<sub>12</sub> Linear alkyl benzene sulfonate</b>	9.31
<b>C<sub>14-15</sub> alkyl ether (0.35 EO) sulfate</b>	12.74
<b>Zeolite Builder</b>	27.79
<b>Sodium Carbonate</b>	27.31
<b>PEG 4000</b>	1.60
<b>Dispersant</b>	2.26
<b>C<sub>12-13</sub> Alcohol Ethoxylate (9 EO)</b>	1.5
<b>Sodium Perborate</b>	1.03
<b>Soil Release Polymer</b>	0.41
<b>Enzymes</b>	0.59
<b>Dye Maintenance Polymer</b>	3.0
<b>Perfume, Brightener, Suds Suppressor, Other</b>	<u>Balance</u>
<b>Minors, Moisture, Sulfate</b>	
	100%

EXAMPLE VLiquid Detergent Test Composition Preparation

- 5        Several heavy duty liquid detergent compositions are prepared containing one or more dye maintenance polymer having a DMP according to this invention. These liquid detergent compositions all have the following basic formula:

TABLE V

<u>Component</u>	<u>Wt. %</u>
C <sub>12-15</sub> alkyl ether (2.5) sulfate	38
C <sub>12</sub> glucose amide	6.86
Citric Acid	4.75
C <sub>12-14</sub> Fatty Acid	2.00
Enzymes	1.02
MEA	1.0
Propanediol	0.36
Borax	6.58
Dispersant	1.48
Na Toluene Sulfonate	6.25
Dye Maintenance Polymer	1.0
Dye, Perfume, Brighteners, Preservatives, Suds Suppressor, Other Minors, Water	<u>Balance</u>
	100%

EXAMPLE VIGranular Detergent Test Composition Preparation

5

Several granular detergent compositions are prepared containing one or more dye maintenance polymer having a DMP according to this invention. Such granular detergent compositions all have the following basic formula:

TABLE VI

	<u>Example</u>	<u>Comparative</u>
<u>Component</u>	<u>Wt. %</u>	<u>Wt%</u>
Na C <sub>12</sub> Linear alkyl benzene sulfonate	9.40	9.40
Na C <sub>14-15</sub> alkyl sulfonate	11.26	11.26
Zeolite Builder	27.79	27.79
Sodium Carbonate	27.31	27.31
PEG 4000	1.60	1.60
Dispersant, Na polyacrylate	2.26	2.26
C <sub>12-13</sub> alkyl ethoxylate (E9)	1.5	1.5
Sodium Perborate	1.03	1.03
Dye Maintenance Polymer	0.8	0
Other Adjunct ingredients	<u>Balance</u>	<u>Balance</u>
	100%	100%

## EXAMPLE VII

## Fabric Softener Test Composition Preparation

5

Several fabric softener compositions are prepared containing one or more dye maintenance polymer having a DMP according to this invention. Such fabric softener compositions can have any of the following basic formulae:

10

TABLE VIIa

	Percent by Weight					
Ingredients	1	2	3	4	5	6
Softener active <sup>1</sup>	24.0	--	--	--	--	25.0
Softener active <sup>2</sup>	--	--	19.2	--	--	--
Softener active <sup>3</sup>	--	--	--	--	18.0	--
Softener active <sup>4</sup>	--	11.0	--	4.0	--	--
Softener active <sup>5</sup>	--	13.5	--	--	--	--
Softener active <sup>6</sup>	--	--	--	3.4	--	--
Dye Maintenance Polymer	0.5	0.5	1.0	2.0	3.0	5.0
Ethanol	4.0	5.0	--	1.0	--	4.0

Isopropanol	--	--	3.0	--	6.0	--
Color care agent <sup>10</sup>	2.5	3.0	3.0	3.0	4.0	--
Calcium chloride	2.0	0.5	0.2	0.05	0.5	0.6
Hydrochloric acid	0.75	--	0.06	0.2	0.02	0.05
Soil release agent <sup>11</sup>	0.5	--	0.2	--	--	0.5
Polyamine <sup>12</sup>	1.0	1.0	1.5	1.5	2.0	2.0
Silicone anti-foam	0.01	--	0.01	0.01	--	0.01
Miscellaneous	1.4	1.0	0.7	0.4	1.0	1.3
Water	balance	balance	balance	balance	balance	balance

1. N,N-di(tallowyl-oxy-ethyl)-N,N-dimethyl ammonium chloride (tallowyl having an I.V. of 50).
2. N,N-di(tallowyl-oxy-ethyl)-N,N-dimethyl ammonium chloride (tallowyl having an I.V. of 18).
- 5 3. 1,2-Ditallowyloxy-3-N,N,N-trimethylammoniopropane chloride.
4. Ditallow dimethyl ammonium chloride.
5. Methyl bis(tallow amidoethyl)-2-hydroxyethyl ammonium methyl sulfate.
6. 1-Tallowamidoethyl-2-imidazoline.
10. N,N,N',N'-terakis(2-hydroxypropyl)ethylenediamine.
- 10 11. Dimethyl terephthalate, 1,2-propylene glycol, methyl capped PEG polymer.
12. N,N'-bis(3-aminopropyl)-1,3-propylenediamine.

TABLE VIIb

Ingredients	Percent by Weight			
	7	8	9	10
DEQA <sup>1</sup>	26.0	25.7	--	30.0
MAQ <sup>2</sup>	--	--	26.0	--
dye maintenance polymer	0.5	1.0	2.0	5.0
Ethanol	2.2	2.4	2.2	2.6
Hexylene glycol	2.6	2.3	2.6	2.6
1,2-Hexanediol	17.0	--	17.0	--
TMPD <sup>6</sup>	--	11.9	--	12.0
CHDM <sup>7</sup>	--	5.0	--	48.1
Water	52.5	53.6	52.5	48.1

Minors <sup>8</sup>	balance	balance	balance	balance
---------------------	---------	---------	---------	---------

1. N,N-di(canoyloxyethyl)-N-2-hydroxyethyl-N-methyl ammonium methyl sulfate available from Witco.
2. Monocanolyl trimethyl ammonium chloride, available as Adogen 417® from Witco.
6. N,N'-(3-aminopropyl)ethylenediamine.
- 5 7. N,N'-(3-aminopropyl)butylenediamine.
8. Tripropylenetetraamine.
9. Trimethyl pentanediol available from Eastman Chemical.
10. 1,4-cyclohexane dimethanol available from Eastman Chemical.
11. Minors can include perfume, dye, acid, preservatives, etc.

10

EXAMPLE VIIIAqueous Treatment Composition Preparation

- Several aqueous treatment compositions are prepared containing one or more dye maintenance polymer having a DMP according to this invention. Such treatment compositions can have any of the following basic formulae:

15

TABLE VIII

Ingredients	Percent by Weight				
	1	2	3	4	5
Cationic dye fixative <sup>2</sup>	--	3.00	--	--	--
Hydrophobic dispersant <sup>3</sup>	25.00	10.00	15.00	--	--
Hydrophobic dispersant <sup>4</sup>	--	--	--	10.00	--
Hydrophobic dispersant <sup>5</sup>	--	--	--	--	50.00
Anti-scaling agent <sup>6</sup>	1.00	--	--	1.00	--
Anti-scaling agent <sup>7</sup>	--	--	--	--	2.00
Enzyme <sup>8</sup>	--	0.50	--	--	--
Polyamine <sup>9</sup>	10.00	20.00	5.00	--	--
Dye Maintenance Polymer	0.5	3.0	2.0	10.0	7.0
Perfume	0.15	0.40	0.10	0.15	0.15
Minors	balance	balance	balance	balance	balance

1. N,N-di-(canolyl-oxy-ethyl)-N-methyl-N-(2-hydroxyethyl) ammonium methyl sulfate.
- 20 2. Selected from REWIN SRF, REWIN SRF-O and REWIN DWR ex CHT-Beitlich GMBH.

3. Polyalkyleneimine having a molecular weight of 1800 and an average ethoxylation per backbone nitrogen of approximately 4.
4. Polyalkyleneimine having a molecular weight of 1800 and an average ethoxylation per backbone nitrogen of approximately 1.
- 5 5. Polyalkyleneimine having a molecular weight of 1800 and an average ethoxylation per backbone nitrogen of approximately 7.
6. Hydroxyethanediphosphonate (HEDP).
7. BAYHIBIT AM ex Baeyer.
8. Suitable enzymes include cellulase, lipase, protease, peroxidase, and mixtures thereof.
- 10 9. N,N'-bis(propyleneamino)-1,4-piperazine.

**WHAT IS CLAIMED IS:**

1. A detergent composition comprising:
  - 5 a) from about 4% to about 70% of a surfactant,
  - b) from about 0.01% to about 10%, preferably from about 0.1% to about 8%, more preferably from about 0.5% to about 6%, and most preferably from about 0.8% to about 5% of a dye maintenance polymer or oligomer having at least three net positive charges per molecule and having a Dye Maintenance Parameter, as determined by the Dye Maintenance Parameter Test, of greater than about 0.23, preferably greater than about 10  
0.6 more preferably greater than about 0.8 and most preferably greater than about 0.9; andwherein the dye maintenance polymer is not a polyethyleneimine or alkoxylated derivative thereof.
2. A laundry additive composition comprising:
  - a) from about 1% to about 99% by weight of water; and
  - b) from about 0.01% to about 50%, preferably from about 0.1% to about 40%, more preferably from about 0.5% to about 30%, and most preferably from about 0.8% to about 15% of a dye maintenance polymer or oligomer having at least three net positive charges per molecule and having a Dye Maintenance Parameter, as determined by the Dye Maintenance Parameter Test, of greater than about 0.23, preferably greater than about 0.6 more preferably greater than about 0.8 and most preferably greater than about 0.9; andwherein the dye maintenance polymer is not a polyethyleneimine or alkoxylated derivative thereof.
3. The laundry additive composition of claim 2, wherein the composition further comprises a pH adjuster and one or more fabric softening components.
4. The detergent composition of claim 1, wherein the composition further comprises a deterative enzyme and preferably comprises an enzyme stabilization system.
5. The detergent composition of claim 1, wherein the composition further comprises an inorganic peroxygen bleaching compound, which is preferably selected from the group

consisting of alkali metal salts of perborate, percarbonate and mixtures thereof, and a bleach activator, which is preferably nonanoyloxybenzene sulfonate.

6. The detergent composition of claim 1, wherein the composition further comprises a cellulase enzyme.
7. The detergent composition of claim 1, wherein the surfactant is selected from the group consisting of nonionic, anionic, cationic, amphoteric, zwitterionic surfactants and mixtures thereof.
8. The detergent composition of claim 1, wherein at least about 4% by weight of the surfactant is an anionic surfactant.
9. A fabric conditioning composition comprising:
  - a) from about 1% to about 80% of a fabric softening active;
  - b) from about 0.01% to about 50%, preferably from about 0.1% to about 40%, more preferably from about 0.5% to about 30%, and most preferably from about 0.8% to about 20% of a dye maintenance polymer or oligomer having at least three net positive charges per molecule and having a Dye Maintenance Parameter, as determined by the Dye Maintenance Parameter Test, of greater than about 0.23, preferably greater than about 0.6 more preferably greater than about 0.8 and most preferably greater than about 0.9; andwherein the dye maintenance polymer is not a polyethyleneimine or alkoxylated derivative thereof.



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/22935

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 C11D3/37 C11D3/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 196 43 281 A (BASF AG) 23 April 1998 (1998-04-23) claims 1-10; examples ---	1-9
X	FR 2 436 213 A (OREAL) 11 April 1980 (1980-04-11) page 28 -page 30; claims 1,10-12; examples 70-76 ---	1,7
X	EP 0 864 642 A (PROCTER & GAMBLE) 16 September 1998 (1998-09-16) examples 1,2 ---	9
X	US 5 789 373 A (HUBESCH BRUNO ALBERT JEAN ET AL) 4 August 1998 (1998-08-04) claim 1; examples I,II ---	2
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

18 February 2000

Date of mailing of the international search report

29/02/2000

Name and mailing address of the ISA

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Fax: (+31-70) 340-3016

Authorized officer

Loiselet-Taisne, S

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 99/22935

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 4 418 011 A (BAUMAN ROBERT A ET AL)  29 November 1983 (1983-11-29)  claims 1-10; examples 11,12  -----</p>	1,7

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/22935

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19643281 A	23-04-1998	WO 9817762 A EP 0934382 A	30-04-1998 11-08-1999
FR 2436213 A	11-04-1980	AR 226161 A AT 601479 A AU 535577 B AU 5075379 A BE 878748 A BR 7905843 A CA 1161605 A CH 661168 A CH 660959 A DE 2936934 A DK 382379 A, B, ES 484124 A GB 2039938 A, B GR 70273 A IT 1119160 B JP 1401588 C JP 55059107 A JP 62007889 B MX 150914 A NL 7906798 A, B, US 4371517 A	15-06-1982 15-07-1993 29-03-1984 27-03-1980 12-03-1980 03-06-1980 07-02-1984 15-07-1987 30-06-1987 27-03-1980 14-03-1980 16-07-1981 20-08-1980 03-09-1982 03-03-1986 28-09-1987 02-05-1980 19-02-1987 16-08-1984 17-03-1980 01-02-1983
EP 0864642 A	16-09-1998	WO 9841605 A	24-09-1998
US 5789373 A	04-08-1998	BR 9707242 A CA 2243965 A JP 11503488 T WO 9728242 A	20-07-1999 07-08-1997 26-03-1999 07-08-1997
US 4418011 A	29-11-1983	AU 554970 B AU 1715183 A CA 1197355 A CH 670543 A DK 345383 A FR 2531450 A IT 1169070 B MX 158947 A ZA 8305225 A	11-09-1986 09-02-1984 03-12-1985 30-06-1989 04-02-1984 10-02-1984 27-05-1987 03-03-1989 27-03-1985

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>7488/JB</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/US 99/ 22935</b>	International filing date (day/month/year) <b>13/10/1999</b>	(Earliest) Priority Date (day/month/year) <b>13/10/1998</b>
Applicant <b>THE PROCTER &amp; GAMBLE COMPANY et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. \_\_\_\_\_



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.



None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/22935

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 C11D3/37 C11D3/00

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## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C11D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	DE 196 43 281 A (BASF AG) 23 April 1998 (1998-04-23) claims 1-10; examples ---	1-9
X	FR 2 436 213 A (OREAL) 11 April 1980 (1980-04-11) page 28 -page 30; claims 1,10-12; examples 70-76 ---	1,7
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X	US 5 789 373 A (HUBESCH BRUNO ALBERT JEAN ET AL) 4 August 1998 (1998-08-04) claim 1; examples I,II --- 74G -/--	2

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

18 February 2000

Date of mailing of the international search report

29/02/2000

Name and mailing address of the ISA

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 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Loiselet-Taisne, S

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/22935

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 4 418 011 A (BAUMAN ROBERT A ET AL)  29 November 1983 (1983-11-29)  claims 1-10; examples 11,12  -----</p>	1,7

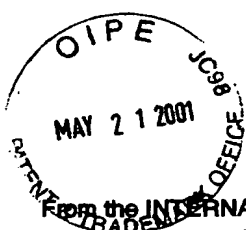
# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/22935

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 19643281	A	23-04-1998	WO 9817762 A EP 0934382 A	30-04-1998 11-08-1999
FR 2436213	A	11-04-1980	AR 226161 A AT 601479 A AU 535577 B AU 5075379 A BE 878748 A BR 7905843 A CA 1161605 A CH 661168 A CH 660959 A DE 2936934 A DK 382379 A,B, ES 484124 A GB 2039938 A,B GR 70273 A IT 1119160 B JP 1401588 C JP 55059107 A JP 62007889 B MX 150914 A NL 7906798 A,B, US 4371517 A	15-06-1982 15-07-1993 29-03-1984 27-03-1980 12-03-1980 03-06-1980 07-02-1984 15-07-1987 30-06-1987 27-03-1980 14-03-1980 16-07-1981 20-08-1980 03-09-1982 03-03-1986 28-09-1987 02-05-1980 19-02-1987 16-08-1984 17-03-1980 01-02-1983
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US 5789373	A	04-08-1998	BR 9707242 A CA 2243965 A JP 11503488 T WO 9728242 A	20-07-1999 07-08-1997 26-03-1999 07-08-1997
US 4418011	A	29-11-1983	AU 554970 B AU 1715183 A CA 1197355 A CH 670543 A DK 345383 A FR 2531450 A IT 1169070 B MX 158947 A ZA 8305225 A	11-09-1986 09-02-1984 03-12-1985 30-06-1989 04-02-1984 10-02-1984 27-05-1987 03-03-1989 27-03-1985



# PATENT COOPERATION TREATY

## PCT

RECEIVED  
MAR 6 2000  
P & G Patent Division  
International JTC

NOTIFICATION OF TRANSMITTAL  
THE INTERNATIONAL SEARCH REPORT  
OR THE DECLARATION

(PCT Rule 44.1)

To:

THE PROCTER & GAMBLE COMPANY  
Attn. REED, T. David  
5299 Spring Grove Avenue  
CINCINNATI, OHIO 45217-1087  
UNITED STATES OF AMERICA

*B.M. Bolam E. Morelle ETC*  
*Mc: Watty / ECatty*

*No CL*

Date of mailing  
(day/month/year)

29/02/2000

Applicant's or agent's file reference

7488/JB

FOR FURTHER ACTION

See paragraphs 1 and 4 below

International application No.

PCT/US 99/22935

International filing date  
(day/month/year)

13/10/1999

Applicant

THE PROCTER & GAMBLE COMPANY et al.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland  
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Further action(s): The applicant is reminded of the following:

Shortly after 18 months from the priority date, the International application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the International application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for International publication.

Within 19 months from the priority date, a demand for International preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2  
NL-2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Maurizio Amodeo



## NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

### INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

#### What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

#### When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

#### Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

#### How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

#### What documents must/may accompany the amendments?

##### Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:  
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:  
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:  
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or  
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:  
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

**"Statement under article 19(1)" (Rule 46.4)**

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

**Consequence if a demand for international preliminary examination has already been filed**

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

**Consequence with regard to translation of the international application for entry into the national phase**

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
 United States Patent and Trademark  
 Office  
 Box PCT  
 Washington, D.C. 20231  
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

<b>Date of mailing</b> (day/month/year) 23 May 2000 (23.05.00)	<b>Applicant's or agent's file reference</b> 7488/JB
<b>International application No.</b> PCT/US99/22935	<b>Priority date</b> (day/month/year) 13 October 1998 (13.10.98)
<b>International filing date</b> (day/month/year) 13 October 1999 (13.10.99)	
<b>Applicant</b> PANANDIKER, Rajan, Keshav et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

02 May 2000 (02.05.00)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<b>The International Bureau of WIPO</b> 34, chemin des Colombettes 1211 Geneva 20, Switzerland	<b>Authorized officer</b>  Pascal Piriou
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

## PCT

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 7488/JB	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US99/22935	International filing date (day/month/year) 13/10/1999	Priority date (day/month/year) 13/10/1998
International Patent Classification (IPC) or national classification and IPC C11D3/37		
Applicant THE PROCTER & GAMBLE COMPANY et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 6 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  02/05/2000	Date of completion of this report  23.11.2000
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Renoth, H  Telephone No. +49 89 2399 8589 

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/22935

## I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

### Description, pages:

1-28 as originally filed

### Claims, No.:

1-9 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/22935

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

## **V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

### **1. Statement**

Novelty (N)	Yes:	Claims	
	No:	Claims	1-9
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-9
Industrial applicability (IA)	Yes:	Claims	1-9
	No:	Claims	

### **2. Citations and explanations see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/US99/22935

**ITEM V**

The following documents cited in the international search report are considered to be relevant with respect to the subject-matter of the present application;

D1: DE-A-196 43 281;

D2: EP-A-0 864 642;

D3: US-A-5 789 373

*Novelty, Article 33(2) PCT*

The compositions of independent claims 1, 2 and 9 as well as dependent claims 3 to 8 are known from D1 (claims 9,10; tables 3,4) and D2 (Examples B-E, I,K,M-2,T-Y).

*Inventive step, Article 33(3) PCT*

1. The problem to be solved by the present application is to impart appearance and integrity benefits to fabrics and textiles laundered in washing solutions.
2. The problem is solved by incorporating into the compositions as defined in the present claims a dye maintenance polymer which has at least three net positive charges per molecule and is not a (alkoxylated-) polyethyleneimine.
3. The closest prior art is considered to be represented by D1.  
The whole document concerns the use of use of polycationic condensation products as dye maintenance additives to avoid the loss or transfer of dye from fabrics.
4. The description of D1 discloses that as the dye maintenance additives, in particular, condensation products are used, which fall within the scope of the preferred dye maintenance polymers of the present application (cf. D1: page 2, lines 20-59 and, in particular, examples 2 and 3).

The description also discloses that the best results were obtained if the degree of quaternised amino groups is between 70% and 100%. These quaternised condensation products should, therefore, contain at least three net positive charges per molecule.

Furthermore, the description (as well as claims 9 and 10) of D1 disclose a detergent agent and a conditioning agent containing the dye maintenance additive.

5. Although, the term "appearance benefit" is not explicitly disclosed in D1, a skilled person knows that the reduction of dye loss and a good appearance are mutually dependent.
6. Moreover, this is clearly stated in both documents D2 and D3, which disclose that: "Dye fixing agents are well known materials which are designed to improve the appearance of dyed fabric by minimising the loss of dye from fabrics due to washing." (cf. D2, col.4, lines 35-40; D3, page 15, lines 21-24)
7. Furthermore, both D2 and D3 disclose dye maintenance polymers which are mentioned in the present application as suitable. As preferred polymers e.g. SANDOFIX TPS™, SANDOFIX SWET™ and TINIFIX ECO™ are mentioned, which can also be found in Table III of the present application.
8. To avoid dye loss, the dye maintenance polymers must set on the fibre like softening agents. Otherwise they have to be considered as dye transfer inhibiting agents. Softening agents are, however, well known to be effective in fibre protection. Therefore, it could have been expected that the dye maintenance polymers also show the property of fibre protection, including integrity benefits.
9. The three independent claims 1, 2 and 9 of the present application do not involve an inventive step, since the use of polycationic polymers as dye maintenance to solve the problem of the present application (impart appearance and integrity benefits) is directly derivable from D1, D2 and D3.



**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/US99/22935

10. Furthermore, dependent claims 3-8 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.
11. The Dye Maintenance Parameter (DMP) which is disclosed in the independent claims 1, 2 and 9 is not considered to contribute anything to the state of the art, which could provide a basis for an inventive step. In the entire application nothing could be found leading a skilled person to the conclusion that DMP has any relationship to a solution (if ever) of the stated problem. This parameter must, thus, be considered to be introduced by the Applicant for any personal reasons.